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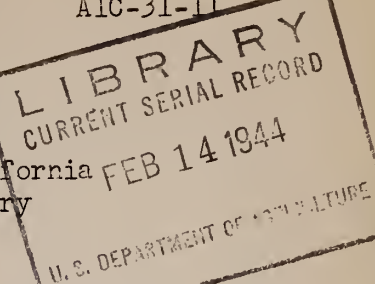


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INFORMATION SHEET ON DRYING-RATE NOMOGRAPHS  
II. BLANCHED SWEET CORN

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The dependence of dehydrator operation, evaluation, and design upon drying time has been pointed out in a previous information sheet (I. Riced White Potatoes). A method of using drying-rate nomographs for the estimation of drying time and nomographic data pertaining to the drying of riced white potatoes were also presented.

This information sheet presents nomographs which represent the drying characteristics of blanched sweet corn.\* The diagrams included are:

- Figure 1 - Drying of sweet corn, metal grid trays, cross air-flow, for the moisture-content range of  $T_0 = 3.35$  to  $T = 0.2$
- Figure 2 - As above, except for  $T = 0.2$  to  $T_f$ .
- Figure 3 - Values of  $f(L_0)$  and  $f(V)$  to be applied to  $\theta_r$  from figure 1.
- Figure 4 - Corrections for figure 1 for the case where  $T_0$  is greater than 3.35.

Figures 1 and 2 are similar to those for riced potatoes. The effects of air velocity and tray loading density are significant only over the range of  $T_0$  to  $T = 0.2$  (data covered by figure 1), and figure 2 is independent of these factors. For values other than  $L_0 = 1.25$  lbs./sq.ft. and  $V = 500$  ft./min., figures 1 and 3 are related by the equation:

$$\theta \text{ (at } L_0, V) = \theta_r \cdot f(L_0) \cdot f(V)$$

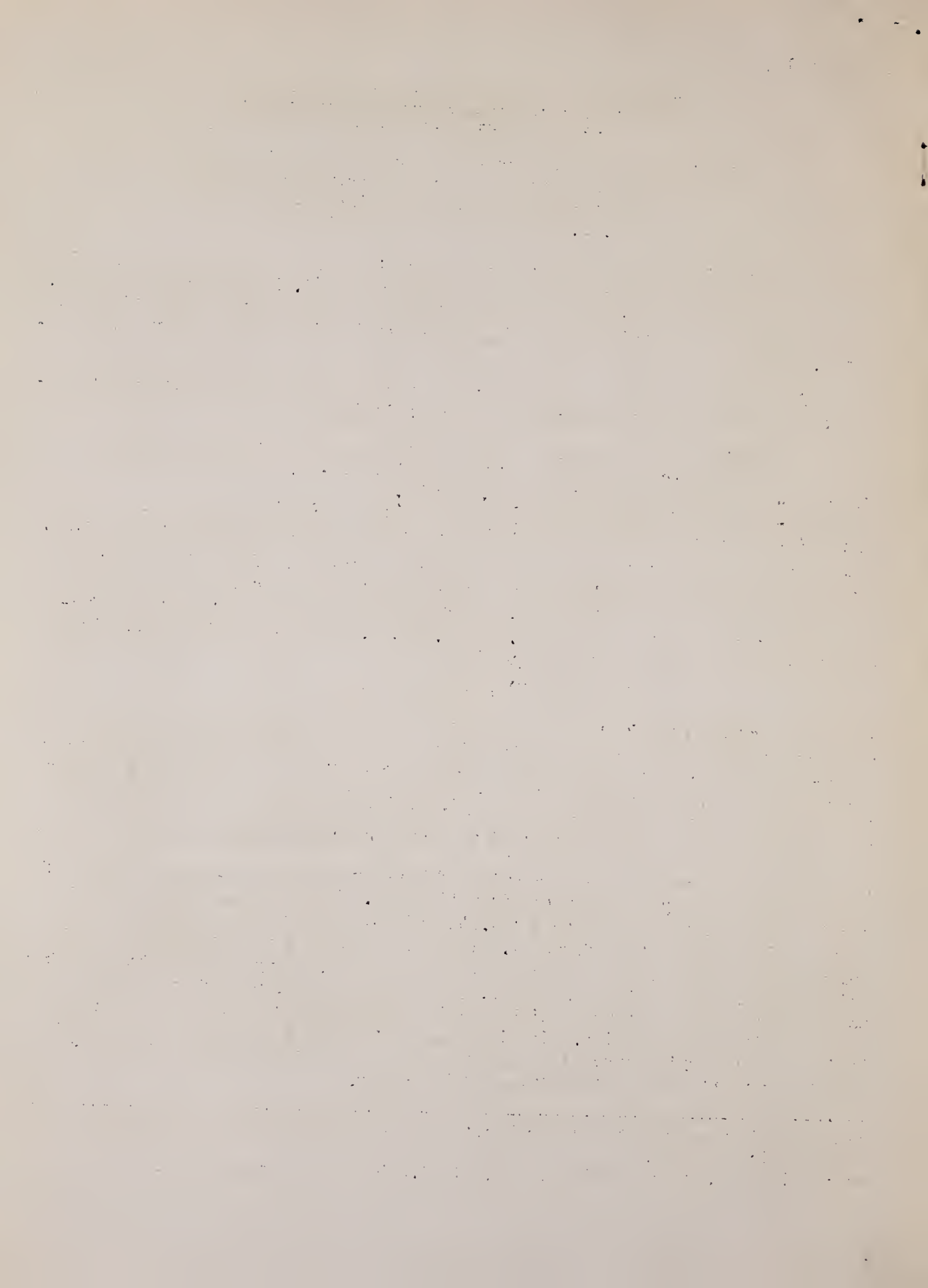
$\theta_r$  is the drying time from  $T_0$  to  $T$  under reference conditions ( $L_0 = 1.25$ ,  $V = 500$ ), and  $f(L_0)$  must be selected from figure 3 at the value of  $T$  to which  $\theta_r$  is measured. The value of  $f(V)$  is also obtained from figure 3, but is not dependent upon the moisture content of the material. This method of correcting for the effect of tray loading and of air velocity is approximate, but the error introduced is within the accuracy of the data under any ordinary circumstances.

The effect upon drying time of a value of  $T_0$ \*\* greater than 3.35 (the value of  $T_0$  for figure 1) may be evaluated from figure 4. This diagram shows the time required for drying from  $T_0$  to  $T = 3.35$ , and this time must be added to the value of  $\theta_r$  obtained from figure 1. (The time required for drying between  $T_0$  and an intermediate value of  $T$  between  $T_0$  and  $T = 3.35$  may also be obtained from this diagram.) If  $T_0$  is less than 3.35, the upper portion of figure 1 may be used to find a time interval which must be subtracted from  $\theta_r$  as obtained from figure 1 without correction. In either case, a plot of  $t_d$  vs.  $T$  (as used for laying out the drying curve into steps) must extend to the actual limits of moisture content and air temperature which apply.

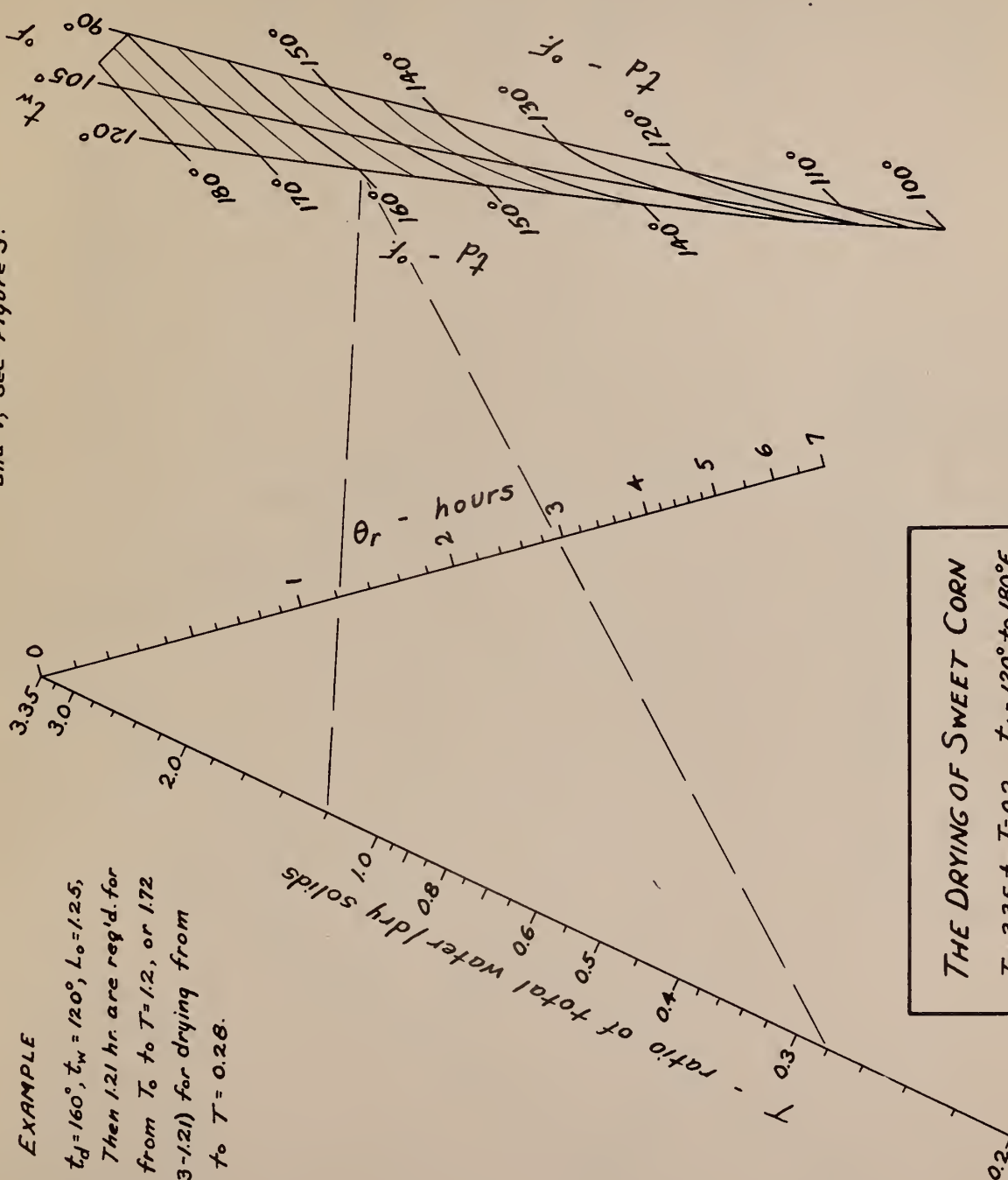
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\*The kernels were cut from the cob after an 8-minute blanch in steam at atmospheric pressure.

\*\*In this work, values of  $T_0$  from 2.6 to 4.2 have been encountered.



For other values of  $L_o$  and  $V$ , see Figure 3.



# EXAMPLE

Given:  $t_d = 160^\circ$ ,  $t_w = 120^\circ$ ,  $L_o = 1.25$ ,  $V = 500$ . Then 1.21 hr. are req'd. for drying from  $T_o$  to  $T = 1.2$ , or 1.72 hr. (2.93-1.21) for drying from  $T = 1.2$  to  $T = 0.28$ .

## THE DRYING OF SWEET CORN

$T_o = 3.35$  to  $T = 0.2$   $t_d = 120^\circ$  to  $180^\circ F$

CROSS AIR FLOW METAL GRID TRAYS

$L_o = 1.25$  lb./sq. ft.  $V = 500$  ft./min.

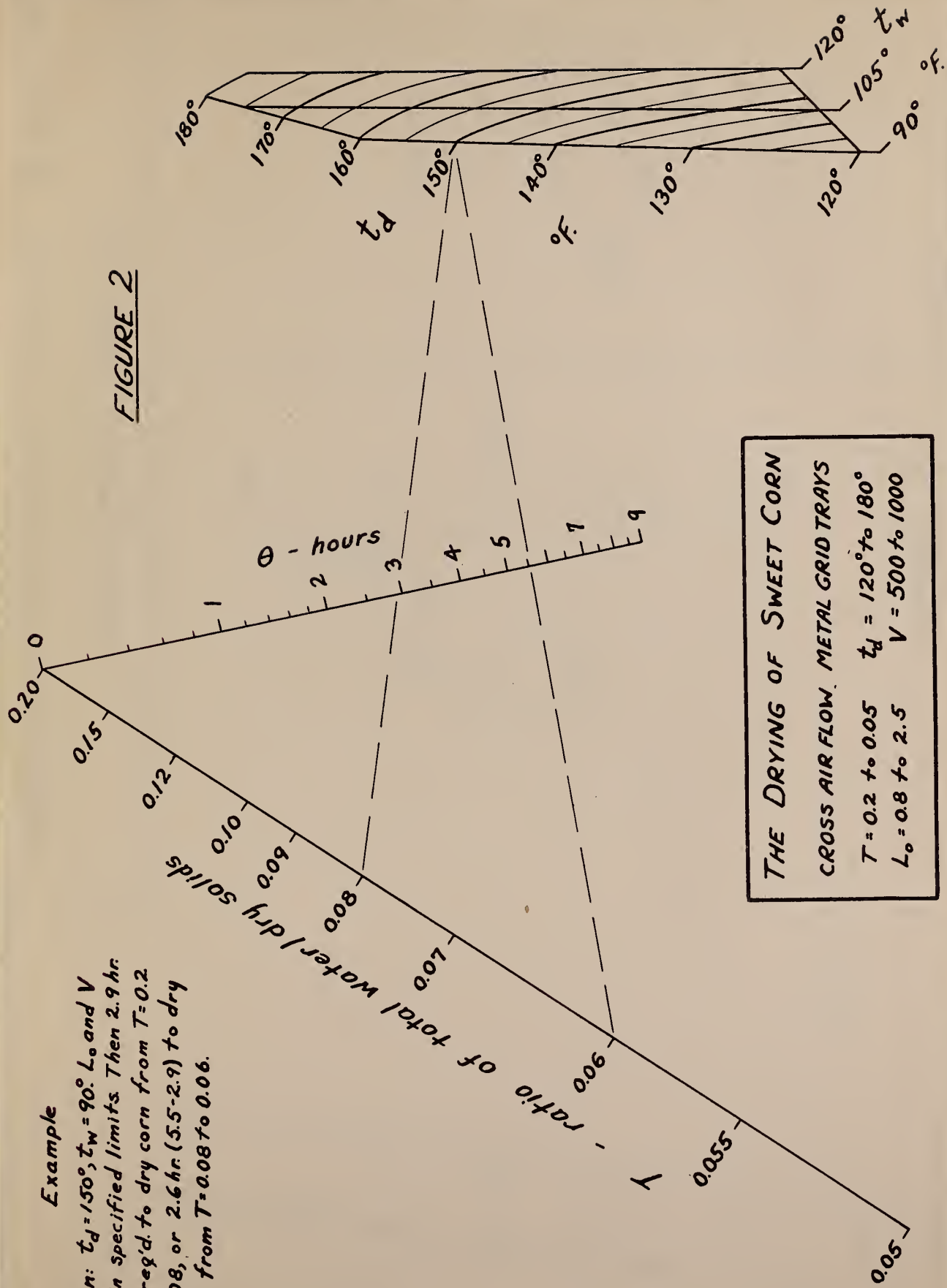
FIGURE 1



### Example

Given:  $t_d = 150^\circ$ ,  $t_w = 90^\circ$ ,  $L_o$  and  $V$  are reg'd. to dry corn from  $T = 0.2$  to  $0.08$ , or  $2.6$  hr. ( $5.5 - 2.9$ ) to dry corn from  $T = 0.08$  to  $0.06$ .

**FIGURE 2**



THE DRYING OF SWEET CORN

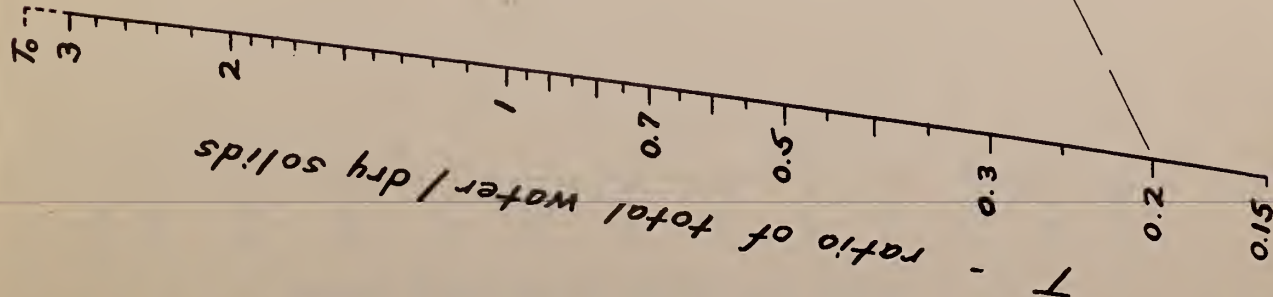
CROSS AIR FLOW, METAL GRID TRAYS

$T = 0.2$  to  $0.05$      $t_d = 120^\circ$  to  $180^\circ$

$L_o = 0.8$  to  $2.5$      $V = 500$  to  $1000$

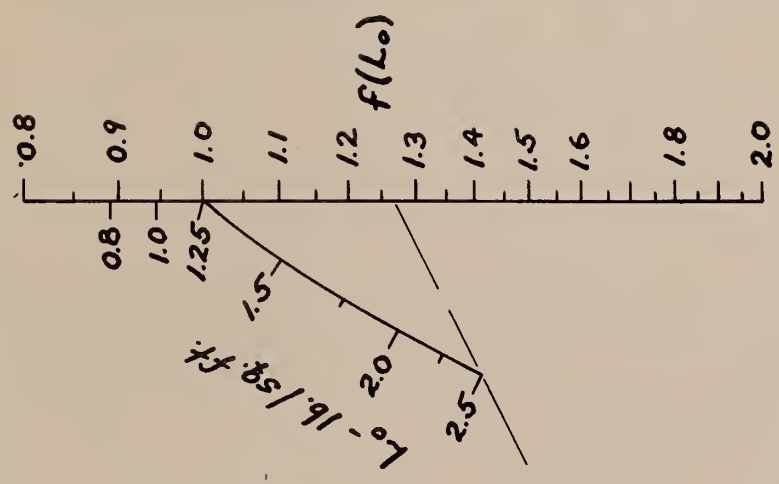






VALUES OF  $f(L_0)$  AND  $f(V)$  IN  $\theta(a+L_0, V) = \theta_r \cdot f(L_0) \cdot f(V)$

SWEET CORN ON METAL TRAYS



Example- When  $L_0 = 2.5$ ,  
 $f(L_0) = 1.27$  at  $T = 0.2$ .

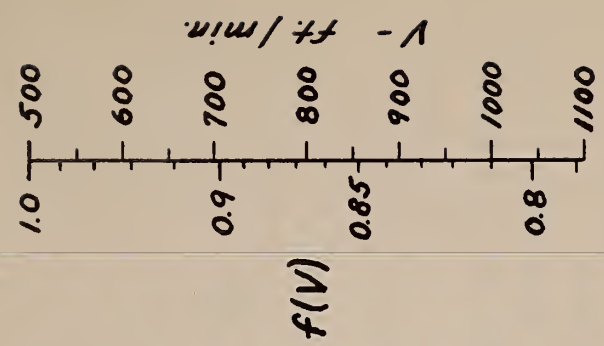
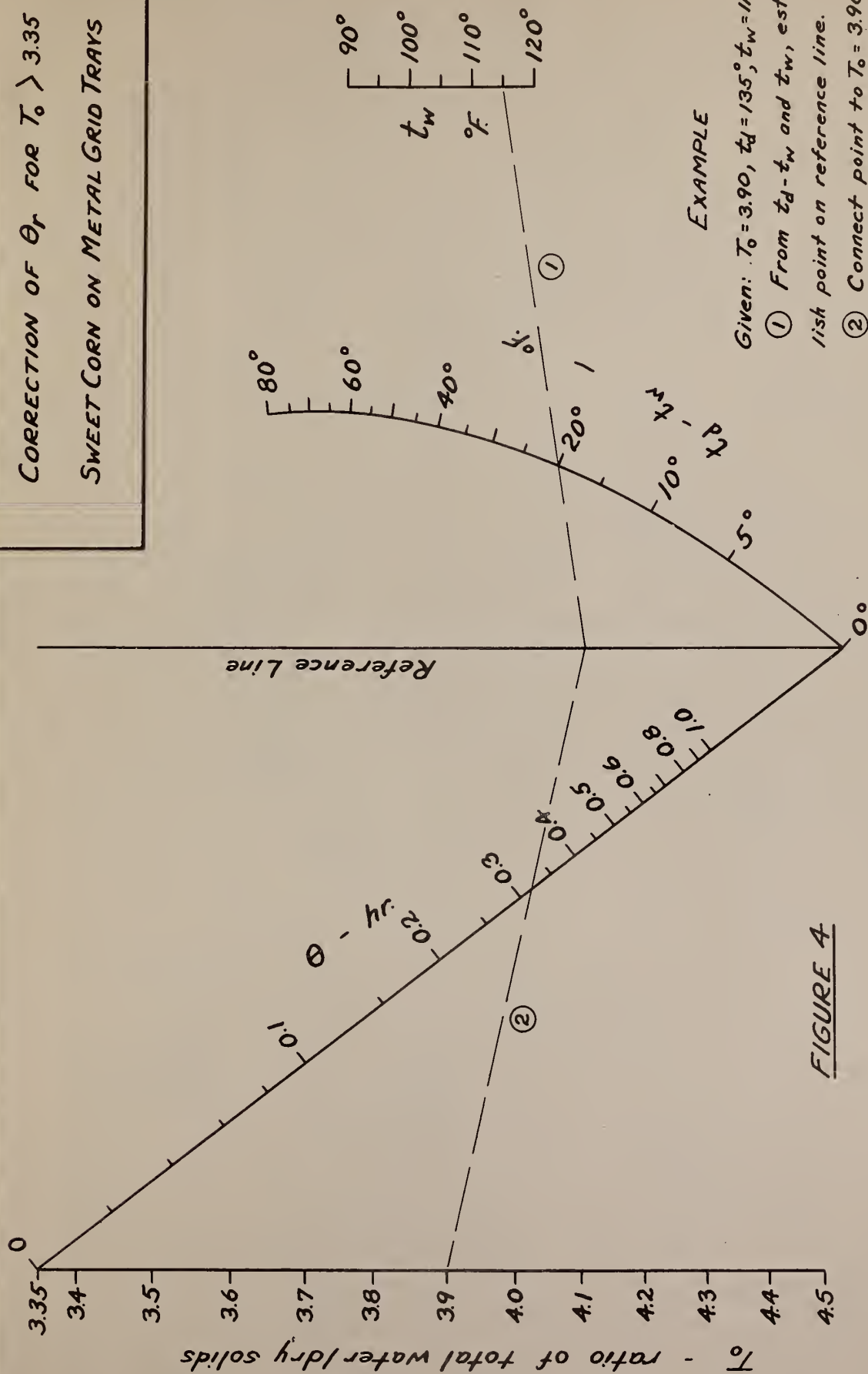


FIGURE 3



CORRECTION OF  $\theta_r$  FOR  $T_o > 3.35$   
SWEET CORN ON METAL GRID TRAYS



EXAMPLE

Given:  $T_o = 3.90$ ,  $t_d = 135^\circ$ ,  $t_w = 115^\circ$

① From  $t_d - t_w$  and  $t_w$ , establish point on reference line.

② Connect point to  $T_o = 3.90$ .

Read  $\theta = 0.32$  hr. to be added to  $\theta_r$  as calculated from Fig. 1.

FIGURE 4

